Appl. No. 09/652,820
Amendment dated April 18, 2005
Reply to Non-Final Office Action of January 18, 2005

Amendments to Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims

Claims 1-15 (cancelled).

Claim 16 (currently amended): An image processing method for recovery of a scene structure from successive image data where motion of the scene structure is linear, the method comprising the steps of:

(a) computing rotational motion in the successive image data using rotational flow vectors derived from a set of intensity data collected from the successive image data, where the rotational flow vectors are represented by

$$\Psi_x \equiv \left[\nabla I \cdot r^{(1)}(p)\right], \Psi_y \equiv \left[\nabla I \cdot r^{(2)}(p)\right], \Psi_z \equiv \left[\nabla I \cdot r^{(3)}(p)\right]$$

where ∇I represents a gradient of the intensity data, $r^{(1)}$, $r^{(2)}$, $r^{(3)}$ are three-point rotational flows with respect to a pixel position p;

(b) constructing a shift data representation for the intensity data that compensates for the rotational motion in the successive image data;

(c) decomposing the shift data representation into a motion vector and a structure vector;

(d) dividing the successive image data into smoothing windows; and

(e) computing a projection matrix which is block diagonal between different smoothing windows and which is used to recover the scene structure by solving for the structure vector.

Claim 17 (previously presented): The image processing method of claim 16 wherein the shift data representation is decomposed using singular value decomposition.

Claim 18 (previously presented): The image processing method of claim 17 wherein singular value decomposition is used to compute a rank-1 factorization of $-\Delta_{CH} \approx M^{(1)}S^{(1)T}$ where $M^{(1)}$ is the motion vector and $S^{(1)}$ is the structure vector.

Claim 19 (previously presented): The image processing method of claim 16 wherein the method is iterated until it converges to a reconstruction of the scene structure.

Claim 20 (currently amended): A device-readable medium comprising instructions for performing an image processing method for recovery of a scene structure from successive image data where motion of the scene structure is linear, the method comprising the steps of:

(a) computing rotational motion in the successive image data using rotational flow vectors derived from a set of intensity data collected from the successive image data, where the rotational flow vectors are represented by

$$\Psi_x \equiv \left[\nabla I \cdot r^{(1)}(p)\right], \Psi_y \equiv \left[\nabla I \cdot r^{(2)}(p)\right], \Psi_z \equiv \left[\nabla I \cdot r^{(3)}(p)\right]$$

where ∇I represents a gradient of the intensity data, $r^{(1)}$, $r^{(2)}$, $r^{(3)}$ are three-point rotational flows with respect to a pixel position p;

(b) constructing a shift data representation for the intensity data that compensates for the rotational motion in the successive image data;

(c) decomposing the shift data representation into a motion vector and a structure vector;

(d) dividing the successive image data into smoothing windows; and

(e) computing a projection matrix which is block diagonal between different smoothing windows and which is used to recover the scene structure by solving for the structure vector.

Claim 21 (previously presented): The device-readable medium of claim 20 wherein the shift data representation is decomposed using singular value decomposition.

Claim 22 (previously presented): The device-readable medium of claim 21 wherein singular value decomposition is used to compute a rank-1 factorization of $-\Delta_{CH} \approx M^{(1)}S^{(1)T}$ where $M^{(1)}$ is the motion vector and $S^{(1)}$ is the structure vector.

Claim 23 (previously presented): The device-readable medium of claim 20 wherein the method is iterated until it converges to a reconstruction of the scene structure.

Claim 24 (new): The image processing method of claim 16 wherein the projection matrix is a N_p by N_p matrix which is defined to annihilate an expression

$$(H^T S^{(1)}) - \Psi w$$

where N_p is a number of pixels in an image, H is a matrix which annihilates the rotational flow vectors, $S^{(1)}$ is the structure vector, Ψ is a matrix formed from the rotational flow vectors, and w is a vector selected so as to allow the structure vector to be solved.

Claim 25 (new): The device-readable medium of claim 20 wherein the projection matrix is a N_p by N_p matrix which is defined to annihilate an expression

$$(H^T S^{(1)}) - \Psi w$$

where N_p is a number of pixels in an image, H is a matrix which annihilates the rotational flow vectors, $S^{(1)}$ is the structure vector, Ψ is a matrix formed from the rotational flow vectors, and w is a vector selected so as to allow the structure vector to be solved.